

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
13 June 2002 (13.06.2002)

PCT

(10) International Publication Number
WO 02/046839 A3

- (51) International Patent Classification⁷: G21G 1/12 (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.
- (21) International Application Number: PCT/US01/51414
- (22) International Filing Date: 19 October 2001 (19.10.2001)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
60/242,102 20 October 2000 (20.10.2000) US
09/881,620 14 June 2001 (14.06.2001) US
- (71) Applicant: UNIVERSITY OF CENTRAL FLORIDA [US/US]; 4000 Central Florida Boulevard, ADM-243, Orlando, FL 32816 (US).
- (72) Inventor: RICHARDSON, Martin; 523 Valley Stream Drive, Geneva, FL 32732 (US).
- (74) Agent: STEINBERGER, Brian, S.; Law Offices of Brian S. Steinberger, P.A., 101 Brevard Avenue, Cocoa, FL 32922 (US).
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:
— with international search report
- (88) Date of publication of the international search report: 30 October 2003

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.



A3

WO 02/046839

(54) Title: LASER PLASMA FROM METALS AND NANO-SIZE PARTICLES

(57) Abstract: Special liquid droplet targets (40) that are irradiated by a high power laser (50) and are plasmarized to form a point source EUV, XUV and x-ray source. Various types of liquid droplet targets include metallic solutions, and nano-sized particles in solutions having a melting temperature lower than the melting temperature of some or all of the constituent metals. The solutions have no damaging debris and can produce plasma emissions (80) in the X-rays, XUV, and EUV (extreme ultra violet) spectral ranges of approximately 0.1 nm to approximately 100 nm, approximately 11.7 nm and 13 nm, approximately 0.5 nm to approximately 1.5 nm, and approximately 2.3 nm to approximately 4.5 nm. The second type of target consists of various types of liquids which contain as a miscible fluid various nano-sized particles of different types of metals which contain as a miscible field various nano-sized particles of different types of metals and non-metal materials.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/51414

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G21G 1/12

US CL : 378/119

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 378/34, 119, 143

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,B	US 6,307,913 A (FOSTER et al.) 23 October 2001 (23.10.2001), column 3, lines 2-8, column 9, lines 7-34.	1-60

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents:

"A"	document defining the general state of the art which is not considered to be of particular relevance	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E"	earlier application or patent published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

18 April 2002 (18.04.2002)

Date of mailing of the international search report

10 MAY 2002

Name and mailing address of the ISA/US

Commissioner of Patents and Trademarks
Box PCT

Washington, D.C. 20231

Facsimile No. (703)305-3230

Authorized officer

David P. Porta *Macales*

Telephone No. 1703-308-0956